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COMMITTEE ON THE PEACEFUL
USES OF OUTER SPACE

PARTICIPATION OF THE UNITED NATIONS IN INTERNATIONAL SPACE YEAR

Note by the Secretariat

The General Assembly, at its forty-fourth session, in its resolution 44/46 of 8 December 1989, endorsed the initiative of international scientific organizations and bodies to designate 1992 as International Space Year (ISY). It also endorsed the recommendation of the Committee on the Peaceful Uses of Outer Space that international co-operation be promoted through the year and that the training and educational capabilities of the United Nations Programme on Space Applications should be utilized to bring about a meaningful role for the United Nations.

To that end, a proposed programme has been prepared by the Outer Space Affairs Division on a preliminary basis which is to be found in annex I to the present paper. Submissions that are still under discussion are shown in annex II. Consultations are continuing with a view to broadening the programme so that Member States of all regions may participate in it.

Annex I

PROPOSED PROGRAMME FOR THE PARTICIPATION OF THE UNITED NATIONS IN INTERNATIONAL SPACE YEAR

I. MANDATE

1. The General Assembly, at its forty-fourth session, adopted on 8 December 1989, resolution 44/46 on international co-operation in the peaceful uses of outer space. In that resolution two paragraphs refer to the International Space Year (ISY):

> "20. Endorses the initiative of international scientific organizations and bodies to designate 1992 as International Space Year;
>
> "21. Endorses the recommendation of the Committee on the Peaceful Uses of Outer Space that international co-operation should be promoted through the International Space Year, which should be carried out for the benefit and in the interests of all States, taking into particular account the needs of developing countries, and that, in that context, the training and educational capabilities of the United Nations Programme on Space Applications should be utilized to bring about a meaningful role for the United Nations, through voluntary contributions by Member States and without any impact on the regular budget of the United Nations or the existing programme of work of the Programme".

II. SCOPE AND GOAL OF UNITED NATIONS INTERNATIONAL SPACE YEAR ACTIVITIES

2. In fulfilment of the above mandate, the following is proposed:

(a) Scope. The scope of the activities proposed herein will include (i) management of the resources of the Earth and its environment; (ii) long-term education programmes; and (iii) public education;

(b) Goal. Through the above efforts, the United Nations would be able to contribute significantly to the demystification of space science and technology world wide. These efforts should also provide encouragement to all countries, particularly the developing countries, not only to participate in the applications of the technology, but also to undertake programmes that could contribute to the understanding, growth and development of the technology at the local level. The activities proposed below have taken into consideration the objectives of ISY and the needs of the developing countries. On the whole, ISY offers the United Nations and the international community a unique opportunity to achieve major progress in the implementation of recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82);

(c) Consultations. On the basis of the recommendations of the Committee on the Peaceful Uses of Outer Space at its June 1989 session, a/ consultations have been initiated and will continue with Member States, with other departments and agencies of the United Nations as well as with intergovernmental and non-governmental organizations. Additional activities that are currently under development include a number of programmes to be carried out in early 1992. These and the results of further consultations will be reflected in an addendum to the present document;

(d) Funding. As indicated in paragraph 1 above, the General Assembly in its resolution 44/46 indicated that the activities to be undertaken by the United Nations as part of its contribution to International Space Year should be implemented "through voluntary contributions by Member States and without any impact on the regular budget of the United Nations or the existing programme of work of the Programme".

The Secretary-General will be sending a note verbale to Member States requesting voluntary contributions in support of United Nations ISY activities. The response of Member States to the Secretary-General's note verbale will be brought to the attention of the Committee on the Peaceful Uses of Outer Space at its session in June 1990.

III. BACKGROUND OF PROPOSED ACTIVITIES

3. The intervention of mankind in the natural self-regulating processes within the atmosphere is creating major disequilibrium in that medium and is producing climatic changes which may threaten the habitability of planet Earth. Among the other major threats to the Earth's environment are water pollution and deforestation. Atmospheric science is no longer purely a scientific discipline; it is also related to political, economic, managerial, scientific and technical activities of manking. Accordingly, current and future leaders, including policy and decision makers, as well as programme managers in both industrialized and developing countries, would need to be much more environmentally conscious and avail themselves of the opportunities being provided by current and future generations of space platforms and the copious data that are being made available by the latter's sensor systems. The elements of the activities proposed for implementation to address this issue are described in paragraphs 6 through 11 below.

4. Furthermore, the efforts of the United Nations and those of other international entities cannot meet the steadily increasing need for basic education and training in space science and technology and its applications. Educating the large number of people required, at a reasonable cost, can only be done successfully at the local level. While advanced education and training at the local level may require international co-operation in many countries, space-related subjects would need to be integrated into the courses that are routinely offered at national institutions. Such a step would require teachers who are familiar with space science and technology and its applications. Today, there is a pronounced scarcity of educators in this discipline. There is also a need to transmit knowledge at all levels, not only through formal education, but also in a manner

that addresses, and is applicable to, the needs of mankind. Such an effort should be aimed at making the international community aware of: (a) the Earth's environment and the role of space science and technology in understanding the environment; (b) individual contributions to the safety and management of that environment; and (c) the interrelationship between the Earth and the rest of the universe. As part of its ISY activities, the United Nations will undertake a number of long-term educational activities as proposed in paragraphs 12 through 19 and general education programmes as described in paragraphs 20 through 28.

IV. PROPOSED PROGRAMME ELEMENTS

5. The specific elements of proposed United Nations ISY activities are described below. The United Nations would strongly encourage other entities to share in the ensuing responsibilities for these activities.

A. Management of the resources of the Earth and its environment

6. Organization of a 30-day international training course in co-operation with the Government of the United States of America. The training course will focus on the multidisciplinary use of global data sets, including remotely sensed data, for global change study and resources management. The course instruction will consist of lectures, practical workshop exercises and demonstrations of processing techniques and methods for the applications of environmental data. Emphasis will be on data capture, data characteristics, data-base development, analysis techniques, modelling, assessing results and output product generation. The course, which will be organized for 30 international participants, will be held at the EROS Data Center, Sioux Falls, South Dakota, United States, in September 1991.

7. Organization of an international conference in co-operation with the Government of the United States in 1992. The theme of the conference will be "Satellite remote sensing for resource management, environmental assessment and global change studies: needs and applications in the developing world". The conference format will consist of sessions focusing on the following four topics: user needs from the developing world perspective; identifying data sources to meet user needs; applications to meet user needs; and identifying opportunities for the future. Each conference topic will consist of several sessions, which will include presentations from expert panelists. Each panel will also have time devoted to a question-and-answer period. This one-week conference will be followed by a three-day workshop, the focus of which will be to identify and discuss strategies for developing an international environmental data exchange network through the Global Resource Information Database (GRID) of the United Nations Environment Programme (UNEP). The workshop will be conducted to explore various development and implementation considerations for promoting the exchange of global environmental data as well as to provide "hands-on" training and demonstrations related to the use of space-based data in the GRID system.

8. Regional workshop at Beijing, September 1991. To be organized in co-operation with the Regional Remote Sensing Programme (RRSP) of the Economic and Social

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Commission for Asia and the Pacific (ESCAP) and the Government of China, the workshop will focus on space technology applications to minimize and alleviate the impact of natural disasters, such as forest fires, floods, storms, winds and earthquakes.

9. Marine resources and coastal environmental projects. As a continuation of the activities already initiated by the Space Applications Programme of the Outer Space Affairs Division, co-operation with other departments and agencies of the United Nations and intergovernmental organizations will be solicited in order to support marine resources and coastal environmental projects along the Atlantic coast of Africa, in the Indian Ocean (in co-operation with the Indian Ocean Marine Affairs Co-operation Council (IOMAC)), in the Caribbean Sea (in collaboration with the Commonwealth Secretariat in the United Kingdom of Great Britain and Northern Ireland) and along the Pacific and Atlantic coasts of Latin America. The projects will focus on using existing and future space-acquired data as well as conventional data for mapping, monitoring and management of the coastal environment and marine resources in the above regions. Co-operation for the projects, particularly regarding the availability of relevant data, will be sought not only from the United Nations agencies but also from satellite operators. In respect of these activities, negotiations are in progress with the European Space Agency (ESA) and the State Committee for Science and Technology of the Union of Soviet Socialist Republics, particularly for needed data and technical expertise.

10. Publication on "Mission to Planet Earth". Emphasizing the variety of programmes being undertaken in different parts of the world, it will be issued in 1991-1992 by the United Nations in collaboration with other interested parties. It will emphasize the objectives, scope and elements of those programmes, including international co-operation, the data analysis systems, the space components to be employed and the results attained or anticipated. The publication will be made available particularly to educators, programme managers and decision makers, as well as to libraries and to the scientific communities at large.

11. United Nations ISY workshop, Washington, D.C. The United Nations system plans to organize a two-to-three-day workshop/symposium which could be held concurrently with the Congress/Conference of the Committee on Space Research (COSPAR), the International Astronautical Federation (IAF) or the International Society for Photogrammetry and Remote Sensing (ISPRS) in 1992 in Washington, D.C. Such a symposium/workshop could examine the main theme of ISY and, within that context, focus on the priority needs of developing countries. Topics for discussion would include contributions of the United Nations system in meeting these needs and existing problems and bottle-necks that need to be overcome, including access to data as well as acquiring the necessary knowledge to analyse and make use of such data. The symposium's programme and other details, including logistics, could be worked out during the 1990-1991 meetings of the Scientific and Technical Sub-Committee, the Committee on the Peaceful Uses of Outer Space and the Inter-Agency Meeting on Outer Space Activities of the Administrative Committee on Co-ordination (ACC).

B. Long-term education programmes

12. Establishment of centres for space science and technology education. The Space Applications Programme has convened three regional meetings of experts on space science and technology and its applications within the framework of educational systems in India (1985), Mexico (1986) and Nigeria (1987). As a follow-up, the Programme also organized an international meeting of experts in the United Kingdom (1989), on the development of skills and knowledge in remote sensing technology in the developing countries. The deliberations of the regional meetings and the recommendations of the subsequent meeting in the United Kingdom specifically focused on the need for the United Nations to take a major leadership role in promoting the necessary educational opportunities, particularly for and in the developing countries, for the integration of space science and technology into educational programmes. These recommendations have subsequently been developed into a project proposal for the establishment of three regional Centres for Space Science and Technology Education in existing national/regional educational institutions in the regions of Africa and the Middle East, Asia and the Pacific, and Latin America and the Caribbean.

13. The essence of this proposal is to re-educate educators, particularly those in the natural and physical sciences in the institutions of higher learning and technical colleges in the developing countries, through an intensive education and research experience, initially focusing on educational programmes on remote sensing technology and applicable environmental disciplines, over a period of nine months at each of the centres. The knowledge gained through such exposure, coupled with the experience acquired through the pilot projects the educators would immediately undertake in their own countries as follow-up activities, upon the completion of their programme at the centres, should adequately equip them to introduce relevant aspects of space science and technology into existing education curricula in their respective countries. Such pilot projects would have been agreed to by the country sponsoring the educator; the different aspects of each project would be designed and refined during the educator's participation in the intensive programme at the centre.

14. As part of its contribution to ISY, the United Nations should aim at establishing these centres in at least three regions of the world. Funding for the projects will be solicited from Member States as well as from the United Nations Development Programme (UNDP) and other international funding institutions.

15. Collection and distribution of literature on space science and technology. For the trained educators described above, the scientific community at large and the general public to function appropriately in and benefit from space science and technology programmes, it would be necessary to build at the local level the essential infrastructure, including libraries and communication facilities. Scientific knowledge and technical know-how can advance and be transferred through appropriate information mechanisms, such as books, journals and scientific publications. However, for some years, the majority of the developing countries have not had the resources to purchase such publications, most of which are published in the industrialized countries. The modest financial allocations for the development and growth of science in most developing countries barely provide for the purchase of essential scientific books and journals.

16. Attempts are being made to rectify this situation through the Donation Programme (DP) of the International Centre for Theoretical Physics (ICTP) in Trieste, Italy, which is operated jointly with the Third World Academy of Sciences (TWAS). DP currently recycles some 50,000 books annually to about 500 institutions in 90 countries in the fields of mathematics, physics, chemistry and biology. These publications are donated to the programme by such entities as scientific associations and publishers.

17. In order to assist the developing countries to build their indigenous capability in space science and technology, it is hereby proposed that as part of the United Nations-ISY programme, the United Nations should associate itself with the Donation Programme of ICTP and TWAS so that the current activities of DP may be expanded to encompass space science and technology related disciplines. In this connection, space-faring nations as well as publishers of journals and books in different aspects of space science and technology as well as relevant organizations and associations will be requested to make donations of such literature materials to the programme.

18. Booklet on space education. In 1991-1992, a booklet on space education, specifically oriented towards policy and decision makers, will be published on space education. Its contents will focus on the following: (a) a brief summary on: (i) past, present and future trends in space science and technology; (ii) applications and potential benefits of space science and technology; (iii) space educational opportunities within the United Nations system; (b) delivery of educational programmes through space technology; and (c) introduction of relevant aspects of space science and technology into existing educational curricula, particularly in the natural and physical sciences. This publication will be made available to all Member States, particularly the developing countries.

19. Participation in other ISY activities. The United Nations will participate in and contribute to other international and national ISY activities and will also co-ordinate its own activities with those of other organizations, including COSPAR, IAF and the Space Agency Forum for International Space Year (SAFISY). In this connection, the United Nations will co-operate with SAFISY to develop proposals and recommendations on education and applications for SAFISY's projects in two distinct areas: (a) remote sensing training applications; and (b) education and space. One of the activities of SAFISY for 1990 is a colloquium on "Education and applications" which will be organized at Deauville, France, in February of that year. The colloquium will conclude with the establishment of a panel of experts that will present to SAFISY proposals and recommendations for ISY projects.

C. Public education

20. "Universariums". In most major cities of the industrialized countries, one major feature of general as well as long-term space science education and illustration has been the establishment of planetariums. However, in the 1970s and 1980s, a special concept has crystallized and gained importance, namely, that of a science centre ("universarium"). Here, the planetarium, often referred to as "star theatre", is part of a complex of facilities including such elements as a cinema,

exhibit areas showing several scale models of scientific and application satellite and associated systems, lecture rooms and astronomical observatory equipment. The planetarium itself demonstrates not only natural sky phenomena but also those effects encountered in space travel, including the different goals that have been attained in the rapid advancement of space flight and space science and technology.

21. It is hereby proposed that those countries that do not have such facilities be encouraged to explore the feasibility of establishing them. In this connection, as much information as possible will be collected from and on existing universariums. Subsequently, a booklet on universariums will be published. The booklet will focus on their roles in and impact on society, their benefits, design and management, facilities within planetariums, potential services including educational programmes and a range of the annual cost of running such universariums today. The booklet would be made available to all Member States in the hope that such information could inspire the establishment of such facilities at the national level. The availability of such facilities in most countries of the world will significantly assist in the demystification of space science and technology.

22. Live observation of artificial space objects. Member States, particularly the developing countries, would be encouraged to participate in the "live observation" of artificial space objects. In this connection, the United Nations would co-operate with space-faring nations to produce viewing schedules of their artificial space objects as they fly over major cities of the world. These schedules could then be used to plan the observation of sufficiently bright space objects through either the naked eye or telescopes by the general public. This effort, if successfully carried out, will certainly publicize space science and technology and will provide a major attraction, particularly for young people, and could subsequently stimulate their interest in space science and technology.

23. Special videos. The United Nations should encourage the production of educational video programmes, each not exceeding a half-hour to one hour of viewing time, on topics such as links between outer space and the Earth's environment; space science and technology: its past, current status and future trends; benefits of space exploration and utilization; satellites in aid of navigation and communications; space technology and food production; and development of necessary skills and knowledge with emphasis on research and education.

24. Some of the themes of a series of monthly lectures proposed in paragraph 26 below could be recorded for general distribution. Funding for the preparation of the videos would be sought from private sources. The goal of such an effort would be to have the videos produced and distributed to all Member States, particularly the developing countries, for public viewing and education in their own countries.

25. Monthly lectures. Starting in 1991-1992, monthly lectures will be organized at United Nations Headquarters on different relevant topics on outer space in order to enable the United Nations community and invited guests to keep up to date with advances in space activities. Distinguished guest lecturers from all corners of the world will be invited to contribute to the lecture series.

26. Exhibitions. There appears to be a broad interest in organizing exhibits to mark ISY at United Nations Headquarters in 1991-1992 by Member States,

intergovernmental and non-governmental organizations as well as by the United Nations system. These entities will be invited to mount space-related exhibits in New York. Such exhibits, it is hoped, will have "education" as a major component. The Department of Public Information, which is responsible for supervising exhibits at Headquarters, has indicated its interest in these activities and would provide the necessary guidelines for their successful execution.

27. United Nations participation in Seville EXPO in 1992. A major international EXPO is scheduled to take place at Seville, Spain, in 1992; its theme is the quincentenary of the voyages of discovery of Christopher Columbus, but it will also focus on the coming millennium. The United Nations has been invited to participate in the EXPO and has been granted a pavilion at Seville, free of charge, for its own display. At the present moment, the United Nations Educational, Scientific and Cultural Organization (UNESCO), being in close proximity to Seville, has been designated to act on behalf of the United Nations to facilitate the necessary arrangements. According to the Department of Public Information, in conjunction with ISY, it would be advantageous to reserve a part of the interior of the pavilion for exhibits relating to "New voyages into outer space". The New York exhibition relating to outer space might also be used at the Seville EXPO.

28. National essay contests. All countries of the world will be encouraged to conduct, at the high school level, an essay contest on "My vision of outer space and the promise it holds for my country and mankind"; each submission should not exceed four pages. Each country will be requested to select the leading and most meritorious essay and forward the same to the United Nations Headquarters in New York. All leading essays will be reviewed by a Board of Editors, and a selection will be made for a final publication of selected essays. The author of each leading essay, from each country, will receive a certificate of merit from the United Nations.

Notes

a/ Official Records of the General Assembly, Forty-fourth Session, Supplement No. 20 (A/44/20), paras. 116 and 117.

Annex II

CO-OPERATION BETWEEN THE UNION OF SOVIET SOCIALIST REPUBLICS AND THE UNITED NATIONS IN INTERNATIONAL SPACE YEAR

Discussions are in progress in respect of the following possible joint activities between the United Nations and the Union of Soviet Socialist Republics as proposed by the Government of the Soviet Union:

(1) Organization of an international meeting of young cosmonauts, scientists and specialists in the field of the peaceful exploration of outer space (Moscow, 1992);

(2) Carrying out on board the Soviet Mir space station a series of scientific experiments designed by young researchers, college students and high school pupils from developing countries;

(3) Organization of an international conference on "Outer space and global problems of mankind at the threshold of twenty-first century" (Moscow, 1992);

(4) Acquisition of remote sensing data of the territories of some developing countries and the transfer of the observed data, free of charge, to those countries (for two to three developing countries in each region);

(5) Organization of an international seminar on space communications for the benefit of developing countries to be held at the International Experimental Center of Space Communications, Dubna-Intercosmos, 1992;

(6) Mobile exhibition of the achievements of the Soviet space programme in Washington, D.C., during the COSPAR/IAF Congress and subsequently at United Nations Headquarters.

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Note by the Secretariat

Addendum

Annex III

EUROPEAN SPACE AGENCY PROGRAMME FOR CO-OPERATION WITH THE UNITED NATIONS IN THE INTERNATIONAL SPACE YEAR

In its resolution 44/46, adopted on 8 December 1989, the General Assembly endorsed the recommendation of the Committee on the Peaceful Uses of Outer Space that international co-operation should be promoted through the International Space Year (ISY), which should be carried out for the benefit and in the interests of all States, taking into particular account the needs of developing countries, and that, in that context, the training and educational capabilities of the United Nations Programme on Space Applications should be utilized to bring about a meaningful role for the United Nations.

Based on the above resolution and the ensuing proposed programme contained in document A/AC.105/445, the United Nations and the European Space Agency (ESA) have held consultations on the most suitable contribution that ESA could make on behalf of its member States and on its own behalf to the United Nations ISY activities.

Following those consultations ESA is prepared to contribute to the United Nations ISY activities in the following manner: The European Space Agency is willing to support an activity starting in 1990 and aimed at the collection of historical and future data sets from different satellites, over some specific sites, situated in African countries, within the coverage of the Maspalomas and Fucino ground stations (see map).

This effort is intended to be in line with the recommendations and as a follow-up activity of the United Nations/FAO/ESA Meeting of Experts on Remote Sensing and Satellite Meteorology Applications to Marine Resources and Coastal Management, hosted by Spain (see A/AC.105/436). The choice of the sites on which data sets will be collected will be made in agreement with the countries interested, taking into account the possible use of these data in support of the development programmes (dams, irrigation, roads, hydrology, agriculture, etc.) currently under consideration or implementation.

Over these sites, it is proposed to build up, using both archived and newly acquired data, data sets describing the history of the area over the last several years, and allowing perspective considerations on their future evolution.

The historical data sets should make use of LANDSAT, SPOT and Advanced Very High Resolution Radiometer (AVHRR) data. Acquisition of present data from these satellites will be carried out, depending on actual availability of the Maspalomas and Fucino stations, and in quantities yet to be defined.

The organization of the collected data sets will be such as to allow easy referencing to data from ERS-1 and other future remote-sensing missions. This will allow:

(a) Establishment of long time series of satellite data over the selected areas;

(b) Establishment of relationships of satellite data to in-situ information, and therefore preparation of efficient utilization of future missions;

(c) Increased sensitization of local authorities to the impact of remote-sensing technology, by fully exploiting the demonstration potential of these data sets, presented in a coherent form;

(d) Derivation from the collected data sets of easily understandable information on specific local problems.

In order to prepare for the fruitful use of the data sets referred to above, ESA is willing furthermore:

(a) To co-sponsor with the United Nations, and other possibly interested entities, a workshop on microwave remote-sensing technology to be organized for the benefit of African countries in 1991;

(b) To co-sponsor with the United Nations, and other possibly interested entities, a training course on microwave remote-sensing technology to be organized for the benefit of African countries in 1992, relying upon the utilization of data collected over the previous years;

(c) To consider assistance for the development of a local infrastructure, possibly including the provision of some equipment necessary for the meaningful utilization of the data sets.

COVERAGE ZONE OF THE ERS-1 RECEIVING STATIONS IN
MASPALOMAS (SPAIN) AND FUCINO (ITALY)

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Note by the Secretariat

Addendum

Annex IV

INTERNATIONAL TELECOMMUNICATION SATELLITE ORGANIZATION

Following discussions held between the International Telecommunication Satellite Organization (INTELSAT) and the United Nations, INTELSAT believes that co-operation between the United Nations and INTELSAT in International Space Year (ISY) activities would be beneficial for both organizations, and INTELSAT would be interested in participating in each of the activities discussed.

A. Teleconference

If appropriate procedures are followed, INTELSAT could, for example, provide a free space segment for the proposed broadcast of a teleconference relating to the ISY theme under the currently authorized terms of its Project Access/Special TV Events policy. Of course, INTELSAT can make no commitment for its signatories, but it would be quite willing to request that they provide the ground segment free of charge as well and work with the United Nations to ensure the widest possible distribution of the special ISY broadcast. INTELSAT would also be interested in participating in the substance of the programme and in assisting in structuring the broadcast.

B. Exhibition at United Nations Headquarters

INTELSAT is pleased to confirm its interest in organizing an exhibit to mark ISY for display at United Nations Headquarters. The organization looks forward to further discussions with the United Nations on this activity.

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OF OUTER SPACE

REPORT OF THE UNITED NATIONS EXPERT ON SPACE APPLICATIONS TO THE SCIENTIFIC AND TECHNICAL SUB-COMMITTEE

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II. Long-range fellowships offered by Member States and an international organization within the framework of the United Nations Programme on Space Applications beginning in 1989-1990 .....

INTRODUCTION

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1. At its twenty-sixth session, held in New York from 21 February to 3 March 1989, the Scientific and Technical Sub-Committee of the Committee on the Peaceful Uses of Outer Space (COPUOS) reviewed the activities of the United Nations Programme on Space Applications. The Sub-Committee noted that
16 the 1988 activities of the Programme had been carried out satisfactorily and that the Programme activities for 1989 had been endorsed by the General
17 Assembly in its resolution 43/56 of 6 December 1988. It recommended to COPUOS, for its approval, the activities scheduled for 1990 under the regular budget and took note of other Programme activities, all of which were to be
18 implemented as part of the space-applications-related recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82), as proposed by the Expert on Space Applications in his annual report (A/AC.105/421) submitted to the Scientific and Technical Sub-Committee at its 1989 session.

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I. MANDATE OF THE PROGRAMME

2. The United Nations Programme on Space Applications, hereafter referred to
21 as "the Programme", operates within the scope of its expanded mandate as contained in General Assembly resolution 37/90 of 10 December 1982, taking into account the results of UNISPACE 82, with special emphasis on the following activities: (a) provision of long-range fellowships for in-depth training; (b) provision of technical advisory services to Member States and regional institutions upon request; (c) organization of a series of regional and international training courses, seminars, workshops and technical expert meetings for the benefit of specialists, educators, managers and decision-makers in order to enhance their technical capabilities as well as to keep them abreast of ongoing developments in the discipline; (d) provision of assistance in the development of indigenous capability at the local level; (e) acquisition and dissemination of space-related information; and (f) promotion of greater co-operation between developed and developing countries, as well as among developing countries. Presented below is a summary of the activities carried out in 1989, those scheduled for implementation in 1990 and those proposed for 1991. Annex I to the present report contains a summary of the activities carried out by the Programme in the period 1983-1989.

A. Long-term fellowship programmes for in-depth training

3. The Programme received 40 long-term fellowship offers for 1989/90 from the Governments of Austria (2), Brazil (10), the German Democratic Republic (3) and the Union of Soviet Socialist Republics (21), as well as from the European Space Agency (ESA) (4); all those fellowships have been renewed for the 1990/91 period. The status of the awards and the recipients' countries are contained in annex II to the present report.

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4. The Government of Austria renewed its annual offer of two fellowships for in-depth training in microwave technology, each for a period of one year. The 1989/90 fellowship offers, already awarded and accepted, are for the period 1 October 1989 to 30 September 1990; these awards are tenable at the Technical University Graz, Graz, Austria.

5. The long-term fellowships offered by the Government of Brazil are for research and applications in remote-sensing technology and are tenable at the Instituto de Pesquisas Espaciais (INPE), São José dos Campos, State of São Paulo, Brazil. The third set of participants in this fellowship series completed their nine months of training at INPE on 30 November 1989. The next set of participants (i.e., the fourth set) will undergo their training at INPE from 2 April to 30 November 1990.

6. The Government of the German Democratic Republic renewed its offer of three fellowships, each for a period of one year, in basic space sciences, satellite geodesy and remote sensing for 1990. These fellowships are tenable at the Central Institute for Astrophysics and the Central Institute for Physics of the Earth of the Academy of Sciences of the German Democratic Republic, Potsdam, from 1 February 1990 to 31 January 1991.

7. The Government of the Union of Soviet Socialist Republics renewed its annual offer of 15 fellowships, each for a period of five years with an additional year for the study of the Russian language; these fellowships are for studies in geodesy, cartography and aerial photography. The nine recipients of the 1989 awards are now in residence at the Moscow Engineering Institute of Geodesy, Cartography and Aerial Photography, for the training period 1989 to 1995. A successful completion of this programme will lead to the award of a Master's degree in engineering sciences. A reorientation of this fellowship programme so that it will be open only to university graduates for a period of three years is under discussion.

8. As indicated in the previous annual report (A/AC.105/421, para. 8), the Government of the USSR has also established six new fellowships in different fields of space science and technology, each for a duration of three years, beginning 1 February 1990. The fellowships are tenable at the institutes of the Academy of Sciences of the USSR and are being offered within the framework of the United Nations Programme on Space Applications for interns and post-graduate students from developing countries. These six new fellowships are being offered to promote the uses of the achievements in space science and technology for social and economic development particularly in the developing countries. The six fellowships are for studies in the following specific disciplines: (a) S. P. Korolev fellowship awards (two) for studies in scientific instrument manufacturing; (b) Ya. B. Zeldovich fellowship awards (two) for studies in theoretical and experimental astrophysics; (c) M. V. Keldysh fellowship award (one) for studies in systems and methods of space information processing; and (d) K. E. Tsiolkovskii fellowship award (one) for studies of the Earth's rotation and lithosphere plate movement using space technology.

9. ESA renewed its offer of four fellowships, each for a period of one year, for the 1989/90 period; the fields of study and the ESA institutions at which the fellowships are tenable are as follows:

(a) Communications engineering and telecommunications: European Space Research and Technology Centre, Noordwijk, the Netherlands, from 1 November 1989 to 30 October 1990, and from 2 January 1990 to 21 December 1990, respectively;

(b) Remote-sensing information systems: European Space Research Institute, Frascati, Italy, from 1 May 1989 to 30 April 1990;

(c) Satellite meteorology: European Space Operations Centre, Darmstadt, Federal Republic of Germany, from 1 October 1989 to 30 September 1990.

B. Technical advisory services

10. The observations and recommendations of the United Nations/United Nations Development Programme (UNDP)/Food and Agriculture Organization of the United Nations (FAO)/ESA Meeting of Experts on Remote Sensing and Satellite Meteorology Applications to Marine Resources and Coastal Management (A/AC.105/436, paras. 10-28) have been conveyed, through UNDP, to Member States of the Atlantic Coast of Africa (ACA) region for their comments. The next phase of this project is a field mission which will focus on developing a viable project proposal for follow-up activities in the following areas:

(a) Development, within an existing viable institution, of a regional programme that would focus on remote-sensing data acquisition, processing, analysis, archiving and dissemination; such a programme should complement the conventional means already in use in each country for oceanographic and marine applications;

(b) Support and strengthening of existing user and training regional remote-sensing centres in the ACA region to enable them to train highly qualified individuals; for this purpose, these centres should expand and enhance their training capabilities and develop needed research facilities in remote sensing, particularly in its applications to marine sciences.

11. Assistance in the form of technical advisory services was provided to the secretariat of the Indian Ocean Marine Affairs Co-operation Council (IOMAC) for the planning of remote-sensing pilot projects to be carried out with financial support from UNDP. As part of a major regional programme to develop Indian Ocean marine resources, these pilot projects are intended to ascertain the feasibility of using satellite remote sensing in the exploration, development and management of coastal and marine resources in the region. In consultation with the IOMAC secretariat, expert advice was offered in the preparation of project proposals by national and regional agencies concerned with remote sensing and marine resources; liaison with technical agencies in potential donor countries was also provided. The Programme will continue to assist the IOMAC secretariat in the execution and further development of these projects.

C. United Nations training courses/meetings of experts/workshops

1. Activities carried out in 1989

12. In 1989, the United Nations conducted four training courses, two meetings of experts and one workshop under the auspices of the Programme. The support of Member States and their institutions as well as those of regional and international organizations, through voluntary contributions, both in money and in kind, and through technical and scientific presentations by their experts, was instrumental in the successful implementation of these activities. A summary of each activity is presented below.

Maspalomas meeting

13. The United Nations/UNDP/FAO/ESA Meeting of Experts on Remote Sensing and Satellite Meteorology Applications to Marine Resources and Coastal Management, organized in co-operation with the Government of Spain, for the benefit of Member States of the Atlantic Coast of Africa region, was held from 8 to 12 May 1989 at the National Institute for Aerospace Technology (INTA)-Maspalomas Station, Gran Canaria, Spain. The meeting was attended by a total of 84 experts from 19 countries and 10 international and intergovernmental organizations; 38 of these experts represented 14 countries situated of the ACA region.

14. The objectives of the meeting were: (a) to analyse the role of space science and technology, particularly remote sensing and satellite meteorology, and related applications in the assessment, evaluation and management of the marine resources and the coastal environment of the ACA region; (b) to examine the mechanisms needed to provide regional atlases, charts and maps and other reference documentation on coastal, territorial and exclusive economic zones of Africa's Atlantic coastline; and (c) to recommend elements that could be used in defining the structure of a project document for future submission to potential donors. Technical presentations were provided by experts from Benin, Cameroon, Canada, Côte d'Ivoire, France, Nigeria, Spain, Sweden, and the United States of America, as well as from FAO, the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Maritime Satellite Organization (INMARSAT), ESA and the United Nations (Outer Space Affairs Division). The observations and recommendations of the meeting addressed the needs of ACA countries in satellite meteorology, marine sciences, shipping and environmental management programmes as well as ways and means of developing programmes and documentation for the management of marine and coastal resources for the area.

15. Funds were provided by the United Nations, UNDP, FAO and ESA to defray the costs of international air travel and per diem for the participants. The Government of Spain provided conference facilities and local transportation for all the participants at the meeting. Follow-up activities on the deliberations of the meeting are described in paragraph 10 of the present report. A detailed report on the meeting is contained in document A/AC.105/436.

Canberra meeting

16. The Fifth UN/FAO/World Meteorological Organization (WMO)/ESA International Training Course on the Use of Remote Sensing Systems in Hydrological and Agrometeorological Applications was held from 15 May to 2 June 1989 at Canberra. The course, organized for the benefit of States members of the Economic and Social Commission for Asia and the Pacific (ESCAP) region, was hosted by the Commonwealth Scientific and Industrial Research Organizations' (CSIRO) Office for Space Science Applications (COSSA) and the Australian Centre for Remote Sensing (ACRES). The objective of the course was to enable participants from developing countries of the ESCAP region to gain practical knowledge in the analysis of environmental and earth resources data obtainable in the visible, infrared and microwave regions of the electromagnetic spectrum, particularly for hydrological and agrometeorological applications. An additional aim of the course was to make participants aware of the characteristics and practical use of the data from current and future Earth observation satellite systems. The course was conducted through illustrated lectures, tutorial presentations and practical exercises. The course was complemented with a number of field trips to verify the accuracy of the image interpretation exercises in the class-room as well as an aerial survey on a research aircraft in order to provide the participants with first-hand experience on the acquisition of airborne radar imagery.

17. The course was attended by 22 participants from the ESCAP region, including an observer from New Zealand. Lecturers and representatives were from Australia, Canada, FAO, WMO, ESA, ESCAP headquarters and the Outer Space Affairs Division of the United Nations. Funds allocated by the United Nations, FAO, WMO and ESA were used to defray the cost of international air travel and daily subsistence for all participants. The Government of Australia provided local transportation and all training facilities. A detailed report on the course is contained in document A/AC.105/437. A follow-up course on digital image processing (MicroBRIAN), sponsored and funded by the Government of Australia, was held at Brisbane, Australia, from 5 to 16 June 1989 and was attended by 12 participants selected from participants in the Canberra course.

Dundee meeting

18. The United Nations International Meeting of Experts on the Development of Remote Sensing Skills and Knowledge was organized in co-operation with the Government of the United Kingdom of Great Britain and Northern Ireland and was hosted by the University of Dundee, Dundee, United Kingdom, from 26 to 30 June 1989. The objectives of the meeting were to pay particular attention to: (a) the development of skills and knowledge in remote-sensing technology; (b) the processes and issues associated with the introduction of elements of space science and technology into existing educational curricula; and (c) the examination of the ways in which developing countries in particular might effect the long-term development of indigenous capabilities in remote sensing and Earth observation from space.

19. In order to accomplish these objectives, the recommendations of the meeting (A/AC.105/438, para. 22) focused on the effective use of existing remote-sensing

technology and environmental data and on the skills and knowledge necessary to support and stimulate research in remote-sensing technology. Some of the recommendations of the meeting are being incorporated in the proposal identified in paragraph 36 below.

20. The meeting was attended by 44 invited international experts from 18 countries and four international organizations. Eighteen of the invited participants were provided with international round-trip air travel by the United Nations; funds provided by the Government of the United Kingdom were used to defray the cost of the local organization of the meeting and to provide a daily subsistence allowance for those 18 participants. A detailed report on the meeting is contained in document A/AC.105/438.

Karachi meeting

21. The United Nations/IOMAC Workshop on Oceanographic/Marine Space Information Systems, co-sponsored by the Government of Pakistan, was hosted by the Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) at its facilities in Karachi from 2 to 6 July 1989. The objective of the workshop was to analyse the needs of space information systems in the assessment, evaluation and management of marine and coastal resources as well as in monitoring the environment of the Indian Ocean region. The recommendations of the workshop focused on data availability and on the establishment of a regional space information system that could serve as an exchange mechanism for scientific co-operation in the management of marine and coastal resources. The workshop provided the participants (professionals in oceanographic and marine-related sciences) with basic information on space information systems, the applications of data available in such systems, and the issues involved in the reception, processing and archiving of vast amounts of information and data.

22. The workshop was attended by 70 participants from 21 countries and 7 international organizations. Funds allocated by the United Nations, UNESCO and IOMAC for the workshop were used to defray the cost of international air travel and partial per diem allowance for 26 of the participants. Conference facilities, room and board as well as local transportation were provided by the Government of Pakistan. The recommendations of the workshop are to be used by IOMAC to develop a viable space-based marine project for the region. A detailed report on the workshop is contained in document A/AC.105/439.

Moscow meeting

23. The United Nations Training Course on the Use of Remote Sensing Data in Agriculture Management, organized in co-operation with the Government of the USSR, was hosted by the USSR State Committee for Science and Technology and the Scientific and Research Centre "AIUS - Agroresources" in Moscow from 25 September to 6 October 1989. The objective of the course was to provide education and practical training to participants from developing countries with respect to the results of recent applications of air- and space-borne remote-sensing techniques to agriculture management. Elements of the course included an introduction to different sensor systems, particularly those that are on airborne and satellite

platforms. The course also introduced the participants to image analysis techniques, vegetation classification and principles of monitoring and management in agriculture, including the use of vegetation index and geographical information systems. A number of exercises were also undertaken as part of the training course in order to provide the participants with practical opportunities on the interpretation and processing of remote-sensing data.

24. Participants from 16 developing countries took part in the training course. Invited lecturers from the following national and international agencies also participated in the course: ESA, the United Nations Environment Programme (UNEP), FAO, the State Commission for Science and Technology of China and the National Aeronautics and Space Administration (NASA) of the United States.

25. The United Nations provided all participants with international air travel as well as a partial daily subsistence allowance for the duration of the course. The Government of the USSR provided hotel accommodation and meals as well as local transportation for all participants. A detailed report on the course is contained in document A/AC.105/440.

Potsdam meeting

26. The Second United Nations International Training Course on Remote Sensing Applications to Geological Sciences, organized in co-operation with the Government of the German Democratic Republic, was hosted by the Academy of Sciences of the German Democratic Republic at its facilities in Potsdam, German Democratic Republic, from 5 to 22 October 1989. The objective of the course was to provide education and practical training to participants from developing countries on recent applications of airborne and satellite remote-sensing techniques to the geological sciences. The course focused on the development and application of techniques for extracting information and for merging disparate data sets that could be used for evaluating geological formations and their selected occurrences. The course was attended by 15 participants. Instruction was provided by experts from the German Democratic Republic, Czechoslovakia, Italy, the Netherlands, Poland and the USSR.

27. The United Nations provided international air travel as well as a partial daily subsistence allowance to all the participants and to a lecturer. The Government of the German Democratic Republic provided room and board and local transportation for the participants for the duration of the training course as well as all facilities necessary for the course. The report on the course is contained in document A/AC.105/441.

Rome meeting

28. The fourteenth United Nations/FAO International Training Course on Remote Sensing Applications to Land Resources, organized in co-operation with the Government of Italy, was held at FAO headquarters in Rome from 6 to 24 November 1989. The objective of the course was to provide participants from developing countries with education and practical training in the use of airborne and satellite remote-sensing techniques for mapping, evaluating and monitoring land resources for the purposes of resource development and environmental management.

29. The programme of the course was as follows: fundamentals of remote sensing; photo-interpretation criteria for land resource studies; principles of satellite imagery interpretation; digital analysis of satellite data; interpretation of land forms, drainage and land systems; land cover, land use and soil mapping, and soil degradation processes; land hazards (floods and waterborne diseases); thermal infrared and radar remote-sensing applications; agrometeorological applications; geographic information systems and economic analysis as well as field work. The course was conducted by means of illustrated lectures, tutorials, practical exercises and field trips. Twenty-three participants took part in the course.

30. Funds allocated by the United Nations, FAO and the Government of Italy were used to defray the cost of international air travel and subsistence expenses in Rome for the duration of the course for 21 of the participants. The course programme was organized jointly by the United Nations, FAO and the Government of Italy. The report on the course is contained in document A/AC.105/442.

2. Activities scheduled for implementation in 1990

31. The following training courses and workshops are scheduled for 1990:

(a) A United Nations Workshop on Space Communication for Development: Current and Future Developments, Rural Communications, Search and Rescue Missions and Disaster Relief is being organized in co-operation with the Government of Cuba and will be hosted by the Academy of Sciences of Cuba, at Havana, from 26 to 30 March 1990. The workshop is being organized for the benefit of member States of the Economic Commission for Latin America and the Caribbean (ECLAC) region. The workshop will pay particular attention to such issues as current and future developments in and direction of the technology, rural communication, search-and-rescue missions and disaster relief as well as those areas in which the developing countries can contribute to future developments in space communications. The workshop will also address the possibilities for regional co-operation;

(b) The fifteenth UN/FAO International Training Course: Remote Sensing Applications to Renewable Resources will be organized in co-operation with the Government of Italy, and held at FAO headquarters, Rome, in September 1990. The course will provide training in the interpretation of satellite and aircraft remote-sensing data for the development and management of renewable resources,

(c) The first United Nations Training Course on Remote Sensing Education for Educators is being organized in co-operation with the Government of Sweden and will be hosted by BITS, the Swedish Agency for International, Technical and Economic Co-operation (through Stockholm University in Stockholm and the Swedish Space Corporation at Kiruna), from 14 May to 15 June 1990. The course will be conducted for the benefit of member States in the Economic Commission for Africa (ECA) region, and its main objective of the course will be to develop practical knowledge and skills of educators in remote-sensing technology and equip them with an ability to introduce elements of the technology, as may be appropriate, into their education curricula into their own countries;

(d) A United Nations Workshop on Basic Space Research for the benefit of developing countries, particularly those in the ESCAP region, is to be held in co-operation with the Government of Kerala State at Trivandrum, India, from 2 to 6 July 1990. The workshop is being organized in recognition of the fact that the scientific, economic and social developments and progress of countries are strongly interconnected and that basic space science, including the physical and mathematical sciences, plays an important role in providing locally derived solutions to problems of development in general. The objective of the workshop is to improve the awareness of scientists from developing countries of the importance of basic research and of the immediate applications that could be generated on the basis of such a knowledge in order to have a greater impact on the development of their respective countries;

(e) The second United Nations/ESA Workshop on Microwave Remote Sensing Technology, being organized in co-operation with the Government of Brazil, will be hosted by the Instituto de Pesquisas Espaciais (INPE), São José dos Campos, São Paulo, Brazil, from 9 to 14 September 1990 for the benefit of ECLAC member States. The objective of the workshop is to provide participants with information relating to a number of microwave remote-sensing satellites planned for launch in the next few years and to discuss how developing countries can individually and co-operatively prepare to use the information that will be provided by these new systems for the development and management of their natural resources.

3. Activities proposed for implementation in 1991

32. The following training courses and workshops are proposed for 1991:

(a) A United Nations workshop to be held at Beijing in September 1991, in co-operation with ESCAP's Regional Remote Sensing Programme (RRSP) and the Government of China; the workshop will be organized for the benefit of ESCAP member States and will focus on space technology applications to minimize and alleviate the impact of natural disasters, such as forest fires, floods, storms, high winds and earthquakes;

(b) The sixteenth United Nations/FAO International Training Course: Remote Sensing Technology Applications, organized in co-operation with the Government of Italy;

(c) The sixth United Nations/FAO/WMO/ESA Training Course on Remote Sensing Technology for Development for the benefit of Member States in the ECLAC region;

(d) The third United Nations training course on communications technology for development, organized in 1991 in co-operation with the Government of the USSR;

(e) The third United Nations/ESA workshop on microwave remote-sensing technology for the benefit of Member States in the ECA region;

(f) The Third United Nations Training Course on Remote Sensing Applications to Geological Sciences, organized in co-operation with the Government of the German Democratic Republic.

D. Development of indigenous capability

33. Member States have emphasized the need for the United Nations Programme on Space Applications to establish an activity that would complement its short- and long-term fellowship programmes in order to enhance the capabilities of the developing countries in space science and technology. As the frontier of the technology unfolds and advances, the Programme has continued to strengthen its activities in order to provide needed support for the development of indigenous capability in space science and technology and its applications so that developing countries might also contribute to its development and growth.

34. In order to achieve this objective, an effort should be made to introduce relevant aspects of space science and technology into existing education curricula in each of the developing countries. Such an effort would require the participation of many educators. One feasible way to address this need is to establish regional programmes (such as centres for space science and technology education) at existing and viable national or regional institutions for training, within a regional setting, those educators who are working within the educational systems in their respective countries. The elements of such a programme are outlined in a report by the Secretariat entitled "Measures necessary for improving education in space technology and applications in developing countries" (A/AC.105/394, paras. 30-43).

35. By providing appropriate training to educators in institutions of higher learning on a long-term basis (e.g, nine months), such a programme would seek to achieve the inculcation of relevant aspects of space science and technology (beginning with remote sensing, environmental sciences and related technologies) into existing education curricula, particularly in those of the physical, natural and environmental sciences at institutions of higher learning. Through this effort, such a programme would produce many multiplying effects and would thereby:

(a) Contribute significantly to the development of indigenous capability in remote sensing, satellite meteorology and environment-related disciplines in member States;

(b) Enhance the overall scientific and technical education in member States;

(c) Enhance the quality and quantity of contributions of graduates, particularly from the institutions of higher learning, in the overall development and management of the resources and the environment of their respective countries.

36. As part of its contribution to the International Space Year and in its effort to achieve major progress in the implementation of the recommendations of UNISPACE 82, the United Nations should lead an international effort to establish regional centres for space and technology education in existing national/regional educational institutions in the regions of Africa and the Middle East, Asia and the Pacific and Latin America and the Caribbean.

37. The activities of these centres should focus on re-educating educators, particularly those in the natural and physical sciences at the institutions of

higher learning and technical colleges in the developing countries, through an intensive education and research experience. Initially, such an educational programme should focus on remote sensing technology and applicable environmental disciplines, over a period of nine months, at each of the centres. The knowledge gained through this exposure, coupled with the experience acquired through the pilot projects that the educators would immediately undertake in their own countries as follow-up activities upon the completion of their programme at the Centres, should adequately equip them to introduce relevant aspects of space science and technology into existing education curricula in their respective countries. The United Nations Programme on Space Applications is currently finalizing a project proposal for the establishment of such centres. Funding for the establishment of the proposed centres will be sought from member States and international funding agencies.

E. Information systems

38. As indicated in the previous annual report (A/AC.105/421, para. 35), a new edition of the directory on "Education, Training, Research and Fellowship Opportunities in Space Science and Technology and its Applications" (A/AC.105/432) was published in 1989; it was distributed at the thirty-second session of COPUOS in June 1989.

39. Beginning in 1989, a series of papers selected from those presented at the meetings, workshops and training courses organized under the auspices of the United Nations Programme on Space Applications will be published on a regular basis. This step is being taken in order to provide wider circulation of ideas and information that can be of significant benefit to member States as they seek to employ elements of space science and technology in their social and economic development. The publication will be devoted to different aspects of space science and technology, including remote sensing, satellite meteorology, communications and basic space sciences; it will contain papers that provide information of broad and enduring interest as well as those that focus on problems specifically connected to issues relevant to the developing countries. Each paper will appear in its language of presentation. The 1989 publication is entitled "Seminars of the United Nations Programme on Space Applications: selected papers on remote sensing technology" (A/AC.105/443).

F. Promotion of greater co-operation in space science and technology

40. Symposium on Space Commercialization. As part of the activities of the Programme for 1989, the United Nations co-sponsored with the Space Institute of the University of Tennessee, United States, and the American Institute of Aeronautics and Astronautics of the International Astronautical Federation (IAF), an International Symposium on Space Commercialization: Roles of Developing Countries, from 5 to 10 March 1989, at Nashville, Tennessee.

41. A forum was provided at the symposium for both the developed and the developing countries to discuss their products, capabilities, experiences and needs

with respect to the utilization of space. Papers were presented by representatives of the developed and developing countries detailing current and projected developments and opportunities as well as their experiences and needs. Three participants, one each from Brazil, Sri Lanka and Tanzania respectively, were sponsored under the auspices of the Programme (through travel fellowships) to participate in the symposium.

42. Fortieth IAF Congress. Through the Programme, the United Nations co-sponsored the special session on "Space and Flood Management" during the fortieth IAF Congress held at Malaga, Spain, from 7 to 13 October 1989. This special session concentrated on the problems of developing countries. Experts from India, Brazil and Nigeria, whose international air travel was funded by the United Nations, were among those who gave presentations at the session. The main theme of the Congress was "Forty years in space".

43. Fourth Latin American Symposium on Remote Sensing. This symposium organized by The Society of Latin American Professionals Specializing in Remote Sensing (SELPER) and held at Bariloche, Argentina, from 20 to 24 November 1989, reviewed the global progress of remote sensing, with emphasis on Latin America, through presentations of technical papers, panel discussions on special topics and commercial exhibitions. Panel discussions on the participation of the Latin American remote-sensing community in the International Space Year and on preparations for the Space Conference of the Americas: Prospects of Co-operation for Development, scheduled to be held at San José, Costa Rica, from 12 to 16 March 1990, were also held during the symposium. The Programme sponsored the participation in the symposium of two individuals from Ecuador and Mexico, respectively.

44. Future activities. In order to promote greater co-operation in space science and technology between the developing and the developed countries and among the developing countries, plans are in progress to generate collaborative activities that will be carried out in 1990, 1991 and 1992 between the United Nations, COSPAR, IAF, the International Society for Photogrammetry and Remote Sensing (ISPRS) and SELPER.

II. VOLUNTARY CONTRIBUTIONS

45. The 1989 activities of the Programme benefited from a variety of support sources and voluntary contributions:

(a) A number of member States (Australia, Austria, Brazil, Canada, France, German Democratic Republic, Italy, Nigeria, Pakistan, Spain, USSR, United Kingdom and United States) provided support for the activities of the Programme in 1989 in various ways, including the following:

(i) Defrayal of the local expenses of candidates from developing countries in the long-term fellowship programmes (see paras. 3-9 above and annex II to the present report);

(ii) Voluntary cash contributions in 1989, received from the Governments of Austria ($10,000), Nigeria ($5,000), and Pakistan ($15,000);

(iii) Co-sponsorship of the activities of the Programme and, in particular, defrayal of the costs of international air travel, local organization and facilities, room and/or board and local transportation (see paras. 15, 17, 20, 22, 25, 27 and 30);

(iv) Sponsorship (travel and per diem) of experts from member States to provide technical presentations and to contribute to the deliberations of these activities (see paras. 15, 17, 20, 22, 25, 27 and 30).

(b) FAO, WMO and ESA co-operated with the United Nations, through its Programme on Space Applications, to co-sponsor (i.e., defray the costs of organization, local facilities and travel and per diem for participants and the experts from those organizations) the activities summarized in paragraphs 15, 17 and 30 above. In addition, UNESCO, the UNEP Global Resource Information Data base (GRID) and INMARSAT sponsored the participation of their experts (travel and per diem) in the activities described in paragraphs 9, 13, 14, 17, 20, 22 and 24 above.

III. FINANCIAL PROVISIONS AND ADMINISTRATION OF THE 1990-1991 PROGRAMME ACTIVITIES

46. The Programme activities described in the present report will be implemented in the following manner:

(a) Financial provisions. Under the United Nations regular budget, an amount of $252,000 was proposed for the approval of the General Assembly at its forty-fourth session for implementing the 1990 and 1991 activities of the Programme. Because of insufficient budgetary allocations for the mandated and expanded activities of the Programme, it has become necessary to solicit additional funds, as voluntary contributions, in support of the activities of the Programme. These voluntary contributions, which are deposited into the Space Applications Programme Trust Fund account, will be used to supplement the regular budget of the Programme.

(b) Administration by, and contributions and participation of, staff. The Outer Space Affairs Division, and in particular the Expert on Space Applications and his staff, will carry out the activities described in the present report. In this connection, travel would be undertaken as appropriate by the Expert and his staff within the provisions of the biennium travel budget of the Outer Space Affairs Division as approved by the General Assembly at its forty-third session and as may be necessary from voluntary contributions.

(c) Consultants, instructors/speakers and technical materials. Up to 15 specialists in space science and technology and its applications would be required per year to serve as instructors, speakers and consultants during the implementation of the 1990 and 1991 activities. Expenses incurred in respect of

the travel and per diem of these specialists and for necessary technical materials would be met partly from the amount specified in paragraph 46 (a) above and partly from voluntary contributions received from Member States and international organizations.

IV. EVALUATION OF THE ACTIVITIES OF THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS FOR 1986

47. Generally, it takes a minimum of two years for those who have participated in the activities of the Programme to establish needed facilities and support at the local level through which they could make meaningful use of the knowledge they gained from the activities. A survey of the participants in the Programme activities during 1986 was carried out in 1989. The evaluation of the effectiveness of the Programme activities contained in the present report is based on information received as feedback from those participants; the results of this evaluation are contained in the following paragraphs.

48. In 1986, the activities of the Programme included three expert meetings, held at Cartagena, Colombo and Mexico City, and devoted respectively to: (a) the mechanism of regional co-operation in space science and technology, (b) the application of space technology in the management of the resources of the marine environment and (c) space science and technology education. The three training courses organized in 1986 were devoted respectively to remote-sensing applications; agricultural statistics, drought assessment and vegetation monitoring; and operational agrometeorology and hydrology. On 15 March 1989, a questionnaire was sent to the 201 individuals who had participated in those expert meetings and training courses. The statistical evaluation of the responses received is given below.

A. United Nations space applications meetings of experts on the implementation of the recommendations of UNISPACE 82

49. Of the 138 participants in the meetings, 23 responded to the questionnaire. Most of the respondents are individuals currently working simultaneously in at least two of the following applications areas: communications (6), meteorology (8), remote sensing (9), mapping (3), agriculture (2), forestry (2), hydrology (2), geology (2), fisheries (2) and environment (7). Their overall post-meeting activities, which for a particular individual may be in more than one area, can be classified as follows:

	Number of participants
Research and development	10
Planning	11
Operational activities	7
Education	8

50. The table below gives the number of participants who expressed the view that their participation in the workshops had enabled them to initiate, establish, run or direct the following groups, facilities or activities in their different professional fields:

	Initiate	Establish	Run
Study group	4	1	3
Co-ordination of user group	2	2	2
National committee	1	-	3
National programme	1	1	1
Regional/international co-operation	4	1	3
Data receiving station	-	1	2
Data analysis centre	1	1	3
Training facility	1	1	4

B. United Nations training courses on remote sensing

51. Of the 63 participants in the training courses, a total of 28 responded to the questionnaire. The professional activities of several of the respondents have been in more than one area. Eight have continued working in meteorology, 11 in remote sensing, 7 in mapping, 15 in agriculture, 6 in forestry, 7 in hydrology, 1 in fisheries and 7 in the environment. Their overall post-training course activities are as follows:

	Number of participants
Research and development	13
Planning	8
Operational activities	8
Education	6

52. The table below gives the number of participants who expressed the view that participation in the courses had enabled them to initiate, establish, participate in or direct the following groups, facilities or activities in remote sensing:

	Initiate	Establish	Run
Study group	4	4	3
Co-ordination of user group	2	3	2
National committee	-	-	1
National programme	4	4	4
Regional/international co-operation	1	2	3
Data receiving station	1	2	5
Data analysis centre	-	2	2
Training facility	5	-	-

53. On the whole, through their involvements at the local level, the 1986 participants in the activities of the Programme are contributing to the understanding of the technology in their own countries. Through these efforts, these professionals are paving the way for necessary technology development in their respective countries.

V. INTERNATIONAL SPACE YEAR: PARTICIPATION OF THE UNITED NATIONS

54. As part of its resolution 44/46 on international co-operation in the peaceful uses of outer space, during its forty-fourth session in 1989, the General Assembly endorsed the initiative of international scientific organizations and bodies to designate 1992 as international space year, and the recommendation of the Committee on the Peaceful Uses of Outer Space that international co-operation be promoted through the international space year, and that the training and educational capabilities of the United Nations Programme on Space Applications should be utilized to bring about a meaningful role for the United Nations.

55. The scope of activities proposed for United Nations participation in ISY includes: (a) programmes in the management of the resources of the Earth and its environment, (b) long-term education programmes, and (c) public education programmes. These efforts should provide encouragement, particularly to the developing countries to undertake programmes that could contribute to the understanding and development of the technology at the local level. On the whole, ISY offers the United Nations and the international community a unique opportunity to achieve major progress in the implementation of UNISPACE 82 recommendations. Details of these activities, including elements of public awareness and general information, as well as funding requirements for these activities, are contained in document A/AC.105/445.

Annex I

ACTIVITIES CONDUCTED BY THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS IN THE PERIOD 1983-1989 FOLLOWING UNISPACE 82 RECOMMENDATIONS AND GENERAL ASSEMBLY RESOLUTION 37/90

	UNISPACE 82 recommendations mandated through resolution 37/90	Number/types of activities	Number of participants from developing countries	Number of applicants
1.	Promotion of greater exchange of actual experience in space science and technology	9 a/	97 Participants from developing countries have been financed by the Programme to attend COSPAR, IAF, ISPRS, SELPER, etc., activities	203
2.	Promotion of greater co-operation in space science and technology	9	393 Meetings of experts (e.g., Indonesia, Colombia, Sri Lanka, Spain, Pakistan)	-
3.	Fellowship programme for in-depth training	11 types of programmes annually	156 Long-term fellowships (Austria, Brazil, GDR, USSR, ESA)	703
4.	Organization of courses/workshops on advanced space applications on new system developments for specialists, managers and decision makers	24	631 Courses, seminars, etc. 1-4 weeks' duration	2 033
5.	Stimulation of the growth of indigenous nuclei and an autonomous technological base in space technology	4	196 Meetings of experts: education topics (India, Mexico, Nigeria, United Kingdom)	422

	UNISPACE 82 recommendations mandated through resolution 37/90	Number/types of activities	Number of participants from developing countries	Number of applicants
6.	Acquisition and dissemination of information on space science and technology and its applications	2 b/	109 (from both industrialized and developing countries; organized in FRG and Peru)	-
7.	Provision of technical advisory services on space applications projects	21	Countries visited (18) Consultancy provided in New York (5)	21

a/ The proceedings of one of the meetings in category 1 and one of the meetings in category 6 have been published and are available on request.

b/ As a follow-up to one of the recommendations of the meeting held in the Federal Republic of Germany in 1984, the Programme published the following document: "Education, training, research and fellowship opportunities - a directory" (A/AC.105/366 and Add.1; the most recent version was issued as A/AC.105/432).

Annex II

LONG-RANGE FELLOWSHIPS OFFERED BY MEMBER STATES AND AN INTERNATIONAL ORGANIZATION WITHIN THE FRAMEWORK OF THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS BEGINNING IN 1989-1990 a/

Period	Country/ organization	Subject	Financial support by host country/organization	Offered	Selected	Applied	User countries (one or more candidates selected)
1989-1990	Austria	Telecommunications (microwave technology	Subsistence allowance; installation grant; local transportation allowance; health and accident insurance	2	2	18	Ghana, Ethiopia
1990	Brazil	Research and applications in remote sensing	Subsistence allowance; medical and accident insurance	10	-	-	In progress
1990-1991	German Democratic Republic	Basic space sciences	Subsistence allowance; medical insurance	1	-	3	In progress
		Remote sensing	Subsistence allowance; medical insurance	1	-	6	In progress
		Satellite geodesy	Subsistence allowance; medical insurance	1	-	6	In progress
1989-1994	Union of Soviet Socialist Republics	Geodesy, cartography and aerial photography	Subsistence allowance; medical insurance; return air travel on successful completion of programme	15	9	29	Mongolia (2), China, Morocco (2), Syrian Arab Republic, Guinea, Burundi, Ghana
1989-1992	Union of Soviet Socialist Republics	Research fellowships in basic space sciences	Subsistence allowance; medical insurance; return air travel on successful completion of programme	6	4	19	China (2), Mongolia (2)
1989-1990	European Space Agency	Satellite meteorology	Subsistence allowance	1	1	12	India
1989-1990		Communications engineering	Subsistence allowance	1	1	15	Iraq
1989/90		Remote sensing information systems	Subsistence allowance	1	1	3	China
1990		Telecommunications	Subsistence allowance	1	-	16	In progress
			TOTAL	40 b/	18 b/	127 b/	

a/ These fellowship awards were made on the basis of: (i) the background and qualifications of nominated candidates; (ii) the evaluation and recommendations of the United Nations; and (iii) the analysis and final decision of the Government/organization/institution awarding the fellowship.

b/ These figures refer to the fellowship programmes processed as of 15 December 1989.

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COMMITTEE ON THE PEACEFUL USES
OF OUTER SPACE

WMO TROPICAL CYCLONE PROGRAMME: REPORT BY THE WORLD METEOROLOGICAL ORGANIZATION

Note by the Secretariat

The World Meteorological Organization has submitted a report 1/ on its tropical cyclone programme, which covers the period 1 July 1988 to 30 June 1989, English, French, Russian and Spanish.

Notes

1/ In view of the limited number of copies received, the report is distributed to participants only.

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